REMARKS

Claim 70 is amended. Claim 74 is cancelled. Claims 98-105 are newly added. Claims 44-73 and 75-105 are pending in the present application.

Claims 44-73 and 75-97 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,386,876 ("Wyckoff") in view of U.S. Patent No. 4,374,798 ("Mercer"). Applicant respectfully traverses this rejection.

The present invention relates to an oriented plastics material geogrid in which oriented strands form triangular meshes.

Wyckoff relates to the "manufacture of reticulated structures and particularly non-woven nets and like structures from thermoplastic polymeric materials." Col. 1, lines 10-13. Wyckoff discloses that "the reticulated structure or web . . . includes a pluratliy of ribs, at least certain of which are uniaxially oriented and separated from adjacent ribs by undrawn film areas." Col. 2, lines 6-9. Wyckoff strongly cautions against allowing the orientation to pass across the "draw-line." In Figure 5, Wyckoff shows that the draw-line terminates well short of the bar, and is in fact the 45 degree line which could be drawn in Figure 1. Wyckoff at column 2, line 72, states:

> Once the maximum allowable stretch is induced in each of such ribs, the line defining the end of a drawn rib, hereafter referred to as the 'draw-line,' will have approximately the maximum length possible without having the juncture between the ends of adjacent ribs stretch and without having the draw-line of one rib interfere or cross with the draw-lines of other ribs at such juncture.

Wyckoff describes various numerical conditions and values a number of times to buttress his position that allowing the orientation to extend into the bars should be actively avoided. Wyckoff is concerned with avoiding failure of the stretch film structure with very small increases in orientation. Wyckoff warns that if the draw in his structure were increased, there would be a risk of failure of the stretched structure.

Mercer relates to "plastics material integral mesh structures having mesh openings defined by a generally rectangular grid of substantially parallel, oriented strands and junctions

therebetween." Col. 1, lines 8-11. Mercer discloses a "plastic material 11 having planar faces and in which are formed circular holes or depressions 12" that is "drawn in the vertical direction" such that "stretching is performed to such an extent . . . that the outermost portions of the notional junction zones 13 are orientated and stretched out." Col. 3, lines 41-62; Figs. 1 and 2. The plastics material 11 is then drawn in the horizontal direction, as shown in Fig. 3. As illustrated in Figs. 1-3 of Mercer, the plastics material 11 are drawn past the "draw-line" defined by Wyckoff. This is illustrated by the deformation of truth lines 14', 15'.

First, there is no motivation in either Wyckoff or Mercer, nor would one of ordinary skill in the art be motivated, to combine the disclosures of Wyckoff and Mercer. Wyckoff *teaches against* allowing the orientation to pass across the "draw-line." Therefore, in effect, Wyckoff requires that the junctions remain "un-drawn." See, for example, column 1, lines 13-16. The reason for this is that Wyckoff is primarily concerned with thin films of thermoplastic polymeric material. Example 1 of the Wyckoff disclosure, for example, starts with a film having a thickness of 0.010 inches (or 0.25 mm). Examples 2 and 3 start with similar materials. Since Wyckoff uses such thin starting materials, he must avoid orientation of the junctions because overstretching the material would produce an unsatisfactory product from the thin film.

Mercer, by contrast, discloses a mesh structure wherein the "stretched structure has oriented strands which are connected by parallel bars, the orientation of the strands penetrating into the bars" or junctions. (Abstract). Therefore, given that Wyckoff specifically teaches that stretching must not be continued such that orientation goes into the junctions, there exists no reason whatsoever to combine Mercer, which discloses a process in which the orientation *does* extend into the junctions, because Wyckoff *teaches away* from such a process. The combination of the two references in the Office Action is not only made with the benefit of hindsight of the present invention, but also, even with the benefit of hindsight, would not be obvious to one ordinarily skilled in the art since the Wyckoff teaches away from the process of Mercer. The Examiner makes no attempt to address this incongruence.

Second, Wyckoff and Mercer, whether considered in combination or alone, do not teach or suggest all the limitations of the present invention. Claim 44 recites a "geogrid made by

stretching and uniaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising transverse bars interconnected by substantially straight oriented strands, at least some of the strands extending from one bar to the next at a substantial angle to the direction at right angles to the bars and alternate such angled strands across the width of the geogrid being angled to said direction by equal and opposite angles, the orientation of the angled strands extending into the bars."

A geogrid, as known to one skilled in the art, and as defined and provided for by the orientation recited in claim 44, has important strength requirements. Wyckoff is entirely silent on geogrids. Therefore, the non-woven net of Wyckoff is not faced with the same strength requirements and does not disclose or suggest the orientation of claim 44. Likewise, Mercer is silent on providing a geogrid with an orientation such that "at least some of the strands extending from one bar to the next at a substantial angle to the direction at right angles to the bars and alternate such angled strands across the width of the geogrid being angled to said direction by equal and opposite angles," as recited in claim 44. Therefore, Wyckoff and Mercer do not teach or suggest all the limitations of independent claim 44.

Claim 49 recites a "geogrid made by stretching and uniaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising transverse bars interconnected by substantially straight oriented strands, and wherein between the locations where the strands meet the bar, the bars are alternatively weakened and not weakened, the weakened zones in the bars adjacent to the first-mentioned bars being staggered so that a weakened zone in one bar is aligned with respective non-weakened zones in the adjacent bars." For at least the same reasons discussed above with respect to claim 44, Wyckoff and Mercer do not teach or suggest all the limitations of independent claim 49. Furthermore, neither Wyckoff nor Mercer teach or suggest that "the bars are alternatively weakened and not weakened, the weakened zones in the bars adjacent to the first-mentioned bars being staggered so that a weakened zone in one bar is aligned with respective non-weakened zones in the adjacent bars."

Claim 50 recites a "geogrid made by stretching and biaxially orienting a plastics starting material which was provided with an array of holes." Claim 50 further discloses that the

geogrid comprises "a first set of substantially straight oriented strands extending at an acute angle to a first direction; a second set of substantially straight oriented strands extending at an acute angle to the first direction and, as considered in a second direction at right angles to the first direction, alternate (angled) strands of the two sets being angled to the first direction by substantially equal and opposite angles; further substantially straight oriented strands extending in said second direction; and junctions each interconnecting four of the angled oriented strands and two of the further oriented strands, at substantially each junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand." For at least the same reasons discussed above with respect to claim 44, Wyckoff and Mercer do not teach or suggest all the limitations of independent claim 50.

Claim 58 recites a method of making "a uniaxially oriented plastics material geogrid," comprising "providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first mentioned holes." Claim 58 further recites "applying a stretch to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form oriented strands from such zones, thereby forming a structure having bars at right angles to the direction of stretch, interconnected by the oriented strands, the stretch being applied to such an extent that the orientation of the strands extends into the bar." Claim 58 recites limitations similar to claim 44, including a uniaxially oriented plastics material geogrid having bars at right angles to a direction and bars in alternate angles, i.e., hexagons. For at least the same reasons discussed above with respect to claim 44, Wyckoff and Mercer do not teach or suggest all the limitations of independent claim 58.

Claim 60 recites a method making a biaxially oriented plastics material geogrid including, *inter alia*, "providing a plastics sheet starting material which has holes in an array of hexagons . . . applying a stretch in a first direction to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form oriented strands from such zones; and applying a stretch in a second direction substantially at right angles to said first direction to stretch out

strand-forming zones between adjacent holes on the sides of the hexagons and form oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands, the stretching being applied to such an extent that the orientation of the strands extends into substantially each junction so that at substantially each junction." For at least the same reasons discussed above with respect to claims 44 and 58, Wyckoff and Mercer do not teach or suggest all the limitations of independent claim 60.

Claim 70 recites a method of making a plastics material mesh structure comprising the steps of "providing a plastics sheet starting material which has holes in a regular pattern, which holes define potential strand-forming zones extending between respective holes and which on stretching the starting material in one direction would stretch out to form oriented strands" and "forming depressions in and thereby weakening some but not all said potential strand-forming zones without material removal when the plastics material is at a temperature below the lower limit of its melting range, said depressions defining a regular pattern, wherein *in said one direction, said depressions are formed in every other potential strand-forming zone.*" (italicized language added in present amendment). Claim 70 further recites "applying a stretch in said direction so that the weakened potential strand-forming zones form oriented strands but the non-weakened potential strand-forming zones do not form oriented strands though some stretch may be applied thereto and whereby the mesh structure so produced is not that that would be produced from the starting material without said depressions."

Wyckoff does not teach or suggest "applying a stretch in said direction so that the weakened potential strand-forming zones form oriented strands" much less "wherein in said one direction, said depressions are formed in every other potential strand-forming zone," as recited in claim 70. Mercer does not rectify the deficiencies of Wyckoff in this respect. Mercer is entirely silent on forming depressions in every other potential strand-forming zone. Therefore, Wyckoff and Mercer do not teach or suggest all the limitations of claim 70.

Claim 75 recites a method of making an oriented plastics material geogrid including, *inter alia*, the steps of "providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of

each of three hexagons, . . ., the vertices of the hexagons being aligned in a first direction, the vertex pitch of each hexagon being less than the diagonal pitch; applying a stretch in the first direction to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form first and second oriented strands from such zones, the first and second oriented strands extending in different directions to each other; and applying a stretch in a second direction substantially at right angles to the first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form third oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands and triangular meshes are formed each by a first oriented strand, a second oriented strand and a third oriented strand, the first oriented strands entering a junction being substantially aligned and the second oriented strands entering a junction being substantially aligned." As discussed with respect to claim 44, Wyckoff does not teach or suggest either a geogrid with these orientations. Likewise, Mercer discloses right-angled orientations, and not a geogrid with these orientations. Therefore, Mercer and Wyckoff do not teach or suggest all the limitations of claim 75.

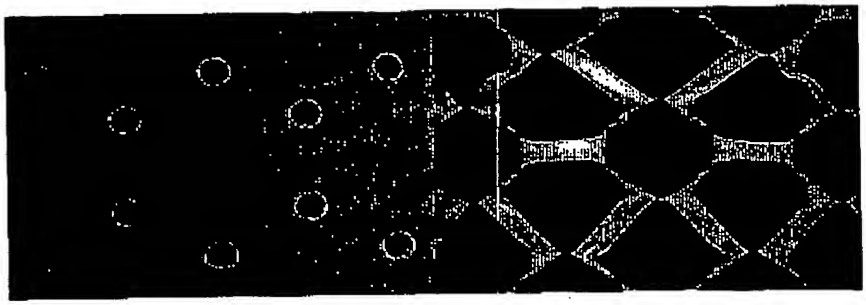
Claim 76 recites a method of making biaxially oriented plastics material mesh structure which has oriented strands which extend at an angle other than 90° to the first and second direction of stretch. The method of claim 76 comprises the steps of, *inter alia*, "applying a stretch in a first direction to stretch out respective strand-forming zones between adjacent holes and form oriented strands from such strand-forming zones; applying a stretch in a second direction substantially at right angles to said first direction to stretch out other respective strand-forming zones between adjacent holes and form further oriented strands from the latter strand-forming zones, whilst applying restraint to the material in the first direction." Claim 76 recites limitations similar to claims 50 and 75. For at least the same reasons as discussed above with respect to claims 50 and 75, Wyckoff and Mercer do not teach or suggest all the limitations of claim 76.

Claim 77 recites a particularly important feature of the present invention. The process of claim 77 requires that the vertex pitch of each hexagon (in the hexagonal array of holes in the sheet starting material) is less than the diagonal pitch. Specifically, claim 77 recites a method of making a biaxially oriented plastics material geogrid comprising "providing a

plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first-mentioned holes, the vertices of the hexagons being aligned in a first direction, the vertex pitch of each hexagon being less than the diagonal pitch; applying a stretch in the first direction to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form first and second oriented strands from such zones . . .; and applying a stretch in a second direction substantially at right angles to the first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form third oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands and triangular meshes are formed each by a first oriented strand, a second oriented strand and a third oriented strand, the first oriented strands entering a junction being substantially aligned and the second oriented strands entering a junction being substantially aligned." Without this arrangement there is a tendency for an "offset" product to be produced (see paragraph bridging pages 8 and 9 and also the description beginning at the foot of page 16).

Fig. 9 of Wyckoff shows a film punched with holes "disposed generally in a hexagonal array" (column 8, line 15) but there is no further disclosure of the precise geometry of this hexagon. Therefore, one might reasonably assume it to be a regular hexagon. Thus, Wyckoff does not teach or suggest a hexagonal array of holes for his starting film in which the vertex pitch is less than the diagonal pitch.

The Applicant has endeavored to repeat the Fig 9 embodiment of Wyckoff and the results are shown in the following photographs. As can be seen below, the stretched structure is not regular and four of the six ribs do not align through the junction.



Moreover, the product of Applicant's reproduction of the Wyckoff disclosure (see right hand figure above) does not produce the preferred structure of the geogrid of the present invention as illustrated in Fig 4 of the present application, i.e., the Wyckoff method produces an "offset" product. Thus, Wyckoff does not teach or suggest the features of claim 77.

Mercer is entirely silent on having holes in a hexagonal pattern, much less one having "the vertices of the hexagons being aligned in a first direction, the vertex pitch of each hexagon being less than the diagonal pitch," as recited in claim 77. Therefore, Wyckoff and Mercer do not teach or suggest all the limitations of claim 77.

Claim 83 recites a geogrid made by stretching and biaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising at least three sets each of at least three spaced, parallel, effectively rectilinear continuous tensile members which extend through the geogrid and each of which comprises an oriented strand, a junction, an oriented strand, a junction, and so on, each junction interconnecting respective strands of the tensile member and the strands of the tensile member being substantially aligned with each other, the tensile members of each set making an angle with the tensile members of the other sets, and the junctions of one set also functioning as the junctions of the other sets whereby a tensile member of each of the sets intersects at the junction, mesh openings being defined by the tensile members, at substantially each said junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent

strand." For at least the same reasons as discussed above with respect to claims 44 and 58 above, Wyckoff and Mercer do not teach or suggest all the limitations of claim 83.

Since Wyckoff and Mercer do not teach or suggest all the limitations of independent claims 44, 49, 50, 58, 60, 70, 75-77 and 83, these independent claims are patentable over the references. For at least the same reasons, dependent claims 45-48, 51-57, 59, 61-69, 71-73, 78-82 and 84-97 are also patentable over the references. Accordingly, Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 44-73 and 75-97 be withdrawn.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: August 30, 2005

Respectfully submitted,

By _____

Stephen A. Soffen
Registration No.: 31,063
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street NW
Washington, DC 20037-1526
(202) 785-9700
Attorney for Applicant